Just Pixels, But A Lot More

By Bill Zalud, Editor Emeritus

If you walked the exhibit floor of ISC West in late March, it seemed everyone except maybe Coca-Cola and Campbell Soup is making or marketing what they call megapixel and HD cameras. The reason is clear – clarity. The more pixels, as in that mega part of the term, the better the images and their details.

During a game-day event at the University of Southern Mississippi, a dozen high-definition cameras were positioned outside and inside the stadium complex and their performance evaluated by the National Center for Spectator Sports Safety and Security's National Sports Security Laboratory.

Still, don't jump to the conclusion that ever more pixels is the better way. The shift to megapixel and HD cameras must come with a shift in decision making by enterprise security leaders and their integrators to matching of resolution to application.

"Our role is protection in all forms ranging from traditional physical security and information security to fraud and investigations – anything related to security," says Jerry Garland, chief security officer for Magellan Health Services, with headquarters in Avon, Conn.

The organization, a leading, diversified specialty health care management organization and ranked in the Fortune 1,000, currently has almost 30 locations throughout the country.

The CSO uses technology where appropriate. "We have analog cameras but started using megapixel cameras especially for their forensics application." In parking lots, for example, the cameras' resolution aids in identifying vehicles and reading license plates. In such cases, "there is no substitute for more pixels," he adds.

Maggie Ward, regional security manager for Magellan Health Services, and Garland's "go to" person when it comes to physical security, says she anticipates many more megapixel camera applications outside of facilities as well as inside where it makes business sense.

What he describes as a DVTel security video shop, Garland's operation contains more than 475 cameras with about 13 terabytes of storage and foresees additional facilities as the organization grows and evolves. In considering future cameras, "we will continue to stress image quality," comments Ward. The key for Garland is technology that is appropriate to the task.

MEASURING SHARPNESS

There continues to be dueling marketing brochures over a standard measure of the level of sharpness required in video surveillance applications. No doubt, the more pixels on a target, the higher the resolution. But networking, video analytics, Best Buy, image storage, transmission, increasing use of video for forensics, Walmart, processing at the edge, megapixel lenses and tumbling prices all are elements accelerating the growth of megapixel cameras.

Wait a minute: Best Buy? Walmart? Many buyers, integrators and manufacturers all agree that residential HDTVs in family rooms and man-caves have shown the advantages for security-centric HD.

Back when, the family camcorder created the economics for CCDs in security video cameras. A recent report by the Cable & Telecommunications Association for Marketing showed that, while 35 percent of households owned an HDTV in 2008, the number grew to 53 percent in 2009. Now consumer acceptance of HDTV is wetting the appetite of security for similar image resolution but with the added benefit of standards driven by general broadcast and cable users. And as HDTV video quality also comes down in price, megapixel cameras are becoming an option for many seeking a move to IP video.

On the big picture side, HDTV refers to both a series of broadcast standards approved by the Federal Communications Commission for consumer use and the high definition television hardware needed to capture and display HDTV images. The main standards used in HDTV broadcasting are:

- 720p (720 lines of resolution scanned progressively) is one of the HDTV standards. As such, ABC and FOX have committed to 720p as their HDTV broadcasting standard. 720p provides a very smooth, film-like image due to its progressive scan formula. Also, even though 720p is con-

sidered high-definition, it takes up less bandwidth than 1080i.

- 1080i (1,080 lines of resolution scanned in alternate fields consisting of 540 lines each) is the most commonly used HDTV format, and has been adopted by PBS, NBC, and CBS (as well as satellite programmers) as their HDTV broadcast standard.
- 1080p, in which 1,080 lines of resolution are scanned progressively, is also in use, providing the most detailed high-definition video image that is currently available.

DETAILS IN INVESTIGATIONS

Beyond display for real-time monitoring, HD provides the detail needed in investigations and for evidence. If there is an incident that occurs where an individual makes a claim against a venue or when a business needs to identify people and activity after the fact, HD has the pixel muscle.

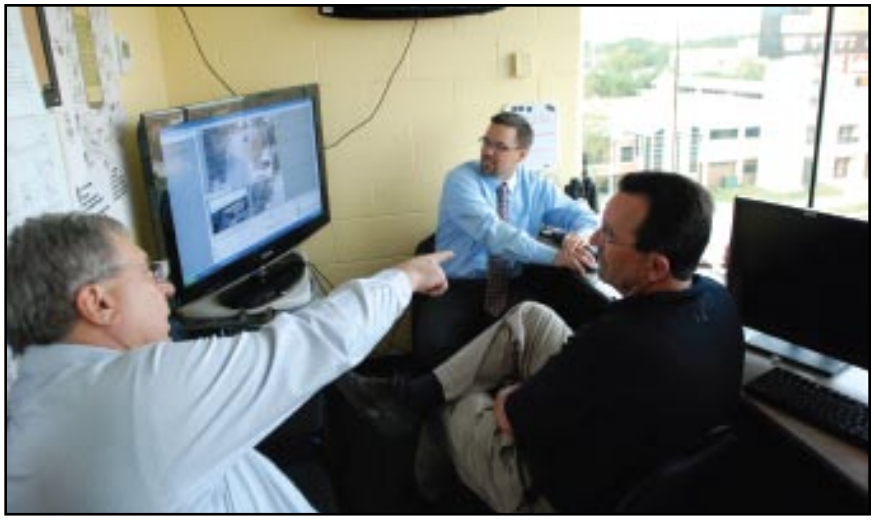
Among choices are cameras ranging from 1.3 megapixel – very popular – and 2, 3, 5, 8 and 10 megapixels. It is also good to look at the ability of the cameras to provide full motion frame rates, even though some end users may dial down the frame rate based on transmission requirements.

Raul Calderon of Arecont Vision feels HD comes into play at 2.1 megapixels. He advises that, when shopping for a megapixel camera, end users need to make sure the vendor is stable, provides a broad range of solutions and can reduce camera count. There is also the need for integration, that not every megapixel camera is integrated the same. Calderon's firm, Milestone and Pivot3, have been traveling the country to talk about a complete IP solution with video management systems, hardware and storage as three components.

EVALUATING CAMERAS

Evaluating HD cameras is a challenging task. The National Center for Spectator Sports Safety and Security's National Sports Security Laboratory at the University of Southern Mississippi has been handling the assignment. For example, during a game-day event at the M.M. Roberts Stadium at the University of Southern Mississippi, a dozen high-definition cameras were positioned outside and inside the stadium complex to monitor fan activity. Two national surveillance companies – Avigilon and Pixel Velocity – teamed up with NCS4 to test the equipment and related procedures. "Video surveillance has surfaced as the top issue facing the security industry right now," says Dr. Lou Marciani, NCS4 director. "The goal with our lab is to vet security solutions for sports at all levels, from college to professional. There is no one else right now doing what we are for collegiate venues through this lab."

Safety and security experts from across the country served as independent evaluators of the entire operation which included a set of pre-arranged scenarios designed to mimic "suspicious" activities. The game-day test began with an initial scenario approximately 3½ hours before kickoff and continued until the final phase was completed during the first quarter. Dr. Marciani says he looks at operational issues as well as the



Arenas and stadiums are locations where megapixel cameras make business sense. Pictured is the National Center for Spectator Sports Safety and Security's National Sports Security Laboratory testing.

Dispelling Some Megapixel Myths

Megapixel Myth: When Megapixel isn't Megapixel. So what are the differences between today's cameras? There are a number of factors to consider. First, from a specification sheet perspective, look at a camera's resolution. Cameras today can vary from VGA to tens of megapixels.

Let's say you need to cover an area 64' wide by 48' deep at a forensic level of detail (40 pixels-per-foot). Taking some liberties to simplify this example (lenses don't actually deliver a square field of view), you would need 64 x 40 pixels wide (=2560) by 48 x 40 pixels deep (=1920) or a total of 4,915,200 pixels (2560 x 1920). If you use a 0.3 "megapixel camera" (translation: VGA camera at 640 x 480), you would need 16 of them to cover the desired space. If you use a 5 megapixel camera, one will do the job.

Now let's calculate costs. If you choose a VGA camera that costs about $200, you will pay 16 x $200 = $3200. Divide the cost by the total number of pixels and you come up with $0.00065/pixel. Alternatively, if you select a high-end, reliable 5 megapixel camera that costs about $1200, using the same calculation your cost would be $0.00024/pixel which is 63 percent cheaper — that's before you consider installation costs like cabling, power and housings.

Megapixel Myth: Interlaced is Not Very Progressive. Another myth centers on details like what type of imager used. If someone talks about an HD1080 camera, they are only giving you half the story. Is it HD1080p or HD1080i? The "p" stands for progressive scan which delivers much higher quality video, especially when there is motion. HD1080i cameras, on the other hand, are "interlaced" cameras that stitch two low resolution images together to make a high resolution picture, which often results in poor image quality when there is scene motion.

The above is provided by Paul Bodell of IQinVision and is part of a three article series, The Truth about Megapixel.

basic technology. "With megapixel cameras, often there is lower image rate on the network until there is a demand for more but with stored details."

Jerry Surak, a NCS4 advisor and chief scientist with Science Applications International Corporation, helped develop the scenarios. He says, "Cameras and sensors must work in concert. There is also a trend to more storage at the edge, too."

In another sports example, the University of Michigan "Big House" recognized it was faced with a new era of security needs. The typical football Saturday doubles Ann Arbor's population by inviting more than 107,501 football fans to witness gridiron action all within a 540,000 square foot area. And when a $280 million renovation gave the Athletic Department and the Department of Public Safety (DPS) the opportunity to go back to the drawing board with a clean slate to develop the security solution they really wanted, megapixel cameras were a valuable part of the action.

On any given game day, more than nine different agencies work with each other including local and state police, FBI, the athletic department, fire, and Homeland Security just to name a few. Along with an integrated radio communications system and bio/radiation detection sensors, full facility visual awareness was necessary to complete DPS's new security system. For instance, Pixel Velocity's Video Fusion system creates panoramic views that allow staff to drill down into high-definition detail on live and recorded video over the stadium's existing network.

Clear, obtainable video information is a significant asset in DPS's decision making capabilities. Video must do three things: Provide full area coverage in order to obtain as much activity as possible; provide significant enough detail to provide clues and evidence that truly solves crimes and serve as usable evidence; and be accessible quickly so that an immediate response can be coordinated rather than spending critical seconds looking for the right piece of video.

By the way, the National Center for Spectator Sports Safety and Security will be further exploring megapixel cameras as well as other technologies at its inaugural national conference set for Aug. 2-4 in New Orleans. *Security* magazine is the media sponsor for the conference at the Astor Crowne Plaza. As many as 300 top professionals in the field of sports safety and security are expected to attend and which will feature guest speakers, breakout workshops,

Forensics is advanced thanks to megapixel cameras, says Jerry Garland, chief security officer for Magellan Health Services.

There are growing uses for megapixel cameras, according to Maggie Ward, regional security manager and the CSO's "go to" person when it comes to physical security.

exhibits and demonstrations of the latest in security technology.

While the New Orleans event will have a specialty twist, the biggest exhibit of security tech – the ISC West this past March – showed off the diversity and attraction of megapixel, HD cameras and, of course, IP video. There is that obvious shift with improved image quality but there are cons among the pros, says Nilsson of Axis, nothing that you need good light, bandwidth and more storage because of the amount of information.

Megapixel cameras can also blend with broadcast needs to give a community views of the weather, traffic and possible security situations to avoid. For instance, the news department at CBS47 in Fresno, Calif., was looking for fresh ideas on how to bring more live local news and weather reports to its viewers without exceeding its budget. Because the San Joaquin Valley encompasses more than 150 miles, the broadcaster could not afford – nor was it feasible – to send camera crews everywhere across the Valley on an as-it-happens basis.

BROADCAST BENEFITS

So Valley Ag Software, a Tulare, Calif.-based network software developer, installed Axis high-resolution network cameras atop radio towers throughout the Valley. The broadcast-quality video from the network cameras streams over an Internet service provider's backbone directly to the news station and CBS47 Web site. Uniquely, "viewers can log onto www.cbs47.tv and control the live PTZ cameras, if we aren't operating them," points out Chad McCollum, CBS47 news director. And, because the unmanned network cameras operate 24/7, the newscasts can include live pictures as well as compressed time-lapse views of weather as it progresses through the Valley.

The cameras support Hi PoE (High Power over Ethernet, IEEE 802.3at), which enabled the installers to use a single cable including the heaters and fans that keep them operating in fluctuating weather.

For many enterprise security leaders, the sweet spot is the 1.3 megapixel camera. More of these cameras are installed than any other size megapixel camera, contends Mark Wilson of Infinova, adding that there is a good reason, as they are very cost-effective. In addition to their lower price versus higher megapixel cameras, 1.3 megapixel cameras give 2x the horizontal view of a standard definition camera. In other words, one 1.3 megapixel camera will cover the area of two standard analog cameras.

HIGHER PIXELS FOR SPECIAL APPS

Megapixel and HD cameras wed well with the Internet, too. For example, among technology displayed in Las Vegas at the ISC West show was a new indoor mini-dome from Honeywell that provides 720p images at extremely low bandwidth for significantly reduced storage requirements, even in low light. It features a Web-based menu to let operators view and control cameras from virtually anywhere.

But before that day arrives, there is the ability to have HD without the IP, or so goes technology from SG Digital. It has a video surveillance system using serial digital interface

(SDI) transmission, which is used by the broadcast industry for transmission of HDTV signals digitally over coaxial cable. SDI transmission is 720p and 1080p video over coaxial cable, uncompressed and non-packetized. SECURITY